

Spot Safety Project Evaluation

Project Log # 200704285

Spot Safety Project # 07-00-217

Spot Safety Project Evaluation of the Installation of Pedestrian Signal Heads And Push Buttons at the Intersection of SR 1902 (Manning Dr) and Hibbard St Orange County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

Brad Robinson, EI

Traffic Safety Project Engineer

7/25/2008
Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 07-00-217 – The Intersection of SR 1902 (Manning Dr) and Hibbard Dr in Orange County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of pedestrian signal heads and push buttons across the west side of SR 1902 (Manning Dr) and across both sides of Hibbard St. In addition, the existing pedestrian heads on the east side of SR 1902 were upgraded to 12” heads.

The subject intersection is a signalized four-leg intersection. SR 1902 has two-lane approaches with a thru-left and a thru-right lane. Hibbard St has single lane approaches. The speed limits are 25 mph on SR 1902 and 10 mph on Hibbard St.

The original statement of problem was that there was a potential for pedestrian accidents. There is heavy pedestrian traffic in the area due to the hospital and the university. The improvements were requested by the Chapel Hill Pedestrian Safety Committee.

The initial crash analysis was conducted from August 1, 1997 to July 31, 2000 with a total of 7 crashes, none of which were considered correctable by the chosen countermeasures. The final completion date for the improvements at the subject intersection was on July 31, 2002 with a total cost of \$15,000.00.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from June 1, 2002 to August 31, 2002. The before period consisted of reported crashes from March 1, 1997 through May 31, 2002 (5 years and 3 months) and the after period consisted of reported crashes from September 1, 2002 through November 30, 2007 (5 years and 3 months). The ending date for this analysis was limited by the available crash data at the time the analysis was conducted.

The treatment data consisted of all reported crashes within 150 feet of the subject intersection. The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Pedestrian Crashes were the Target Crashes for the applied countermeasure. The target crashes are clearly identified in the before and after period collision diagrams.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	19	19	0.0
Total Severity Index	3.34	2.56	-23.4
Target Crashes	1	2	100.0
Target Crash Severity Index	8.4	8.4	0.0
Volume	16,000	15,000	-6.3
<u>Crash Severity Summary</u>			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	2	2	0.0
Class C Crashes	4	2	-50.0
PDO Crashes	13	15	15.4

The naive before and after analysis at the treatment location resulted in no change in Total Crashes, a 100 percent increase in Target Crashes, and a 6 percent decrease in Average Daily Traffic (ADT). The before period ADT year was 1999 and the after period ADT year was 2005.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in no change in Total Crashes and a 100 percent increase in Target Crashes. The Total Severity Index decreased by 23 percent and the Target Crash Severity remained constant. The summary results above demonstrate that although Total Crashes remained constant, Target Crashes appear to have increased at the treatment location from the before to the after period.

The calculated benefit to cost ratio for this project is 2.20 considering total crashes. The benefit to cost ratio considering only target crashes is -1.40. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

The single Target Crash in the before period involved a vehicle turning from the northern leg onto the eastern leg of the intersection and hitting a pedestrian in the sidewalk crossing SR 1902. The crash resulted in a 'B' injury to the pedestrian. One of the after period Target Crashes involved the same movements and also resulted in a 'B' injury. The pedestrian head for this pedestrian movement was the one that was upgraded as part of the project. The second Target Crash in the after period involved a westbound vehicle turning right at the intersection and hitting a pedestrian crossing Hibbard Dr. This crash resulted in a 'C' injury for the pedestrian. In all crashes the driver was cited with failure to yield to a pedestrian.

We do not have pedestrian counts at this intersection, so it is not known if increased pedestrian conflicts contributed to the increase in Target Crashes from the before to the after period.

As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of roadway.

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1902 at Hibbard St
COUNTY: Orange
FILE NO.: SS 07-00-217

BY: BDR
DATE: 7/11/2008

DETAILED COST: TYPE IMPROVEMENT - Ped heads and push buttons

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$15,000	10	0.149	\$2,235
Right-of-Way	\$0	0	0.000	\$0

TOTALS	\$15,000	10	0.149	\$2,235
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ESTIMATED INCREASE IN ANNUAL MAINT. COST =	\$200
ESTIMATED INCREASE IN ANNUAL UTILITY COST =	\$150
TOTAL ANNUAL COST=	\$2,585
TOTAL COST OF PROJECT=	\$15,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	5.25	0	0.00	6	1.14	13	2.48	\$31,867
AFTER	5.25	0	0.00	4	0.76	15	2.86	\$26,190

Annual Benefits from Crash Cost Savings	\$5,676
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NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST	=	\$3,091
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BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST	=	2.20
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TOTAL COST OF PROJECT	-	\$15,000	COMPREHENSIVE B/C RATIO	-	2.20
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BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1902 at Hibbard St
COUNTY: Orange
FILE NO.: SS 07-00-217 Target Crashes

BY: BDR
DATE: 7/11/2008

DETAILED COST: TYPE IMPROVEMENT - Ped heads and push buttons

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$15,000	10	0.149	\$2,235
Right-of-Way	\$0	0	0.000	\$0

TOTALS	\$15,000	10	0.149	\$2,235
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ESTIMATED INCREASE IN ANNUAL MAINT. COST =	\$200
ESTIMATED INCREASE IN ANNUAL UTILITY COST =	\$150
TOTAL ANNUAL COST=	\$2,585
TOTAL COST OF PROJECT=	\$15,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

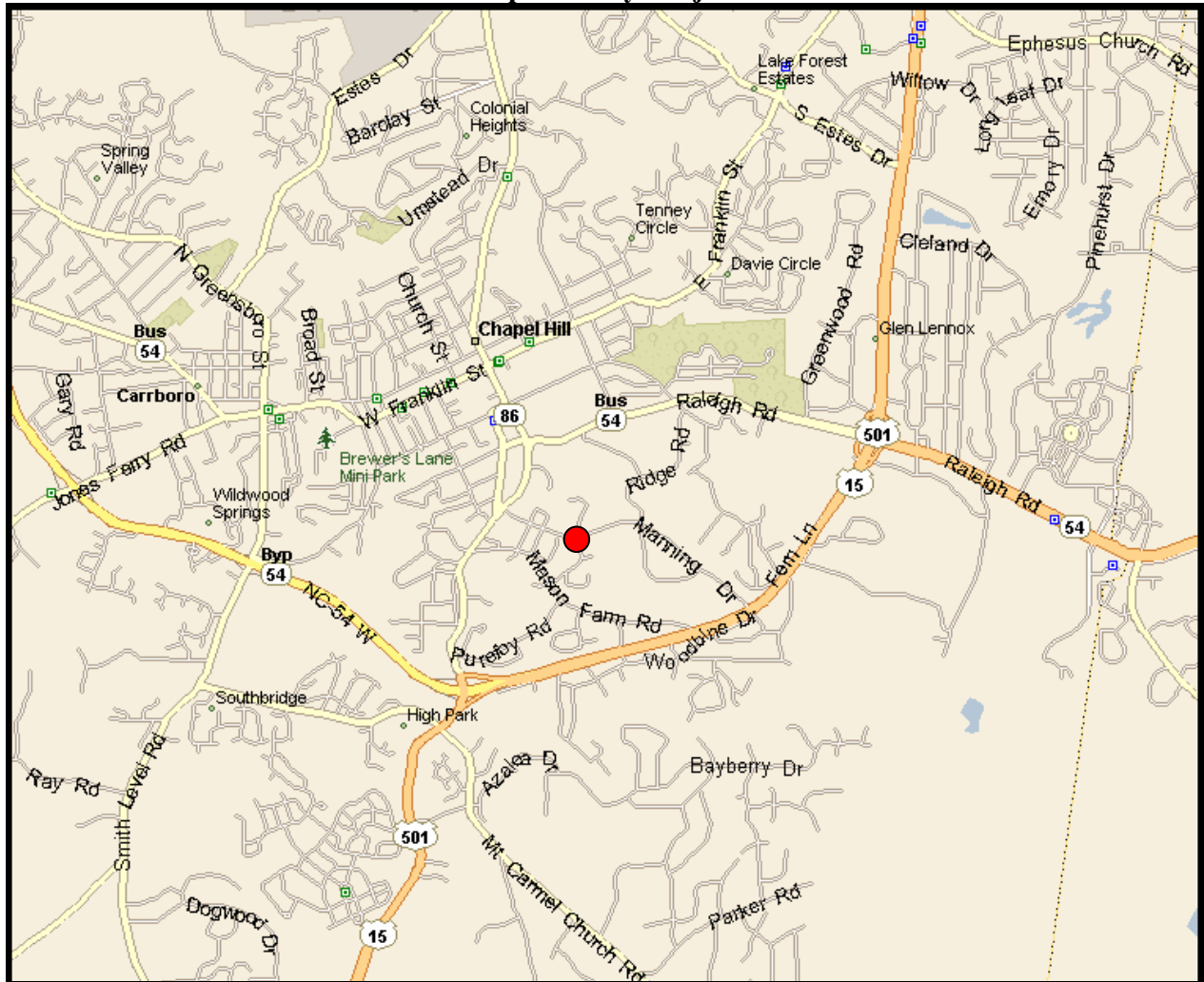
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	5.25	0	0.00	1	0.19	0	0.00	\$3,619
AFTER	5.25	0	0.00	2	0.38	0	0.00	\$7,238

Annual Benefits from Crash Cost Savings (\$3,619)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST	=	(\$6,204)
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST	=	-1.40

TOTAL COST OF PROJECT	-	\$15,000	COMPREHENSIVE B/C RATIO	-	-1.40
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Location Map
Orange County
Evaluation of Spot Safety Project #07-00-217



Treatment Location: SR 1902 (Manning Dr) at Hibbard/Gravely/Emergency Room

2003 Aerial Photo from Orange County GIS Website



Orange County
SR 1902 (Manning Dr) and
Hibbard/Gravely/Hospital Room
Before Period
From 3/1/1997-5/31/1999



LEGEND

→

MOVING VEHICLE

→

PEDESTRIAN

⊠

PARKED VEHICLE

⊠

PARKING VEHICLE

□

FIXED OBJECT

⊠

HEAD ON

⊠

REAR END

⊠

RAN OFF ROAD

→

ANGLE

→

TURNING

→

BACKING

→

SIDESWIPE

→

OUT OF CONTROL

→

INJURY

→

FATALITY

→

9 MPH OR LESS

→

10 MPH TO 19

→

20 MPH TO 29

→

30 MPH TO 39

→

40 MPH TO 49

→

50 MPH TO 59

→

60 MPH TO 69

→

70 AND UP

→

SPEED UNKNOWN

→

DAYLIGHT CRASH

→

DARK CRASH

P

PEDESTRIAN

B

BICYCLE

T

TRAIN

A

ANIMAL

*

DRIVER AT FAULT

D

DRY

W

WET

I

ICY OR SNOWY

SR 1902 (MANNING DRIVE)
25 MPH

HIBBARD STREET
10 MPH

SR 1902 (MANNING DRIVE)
25 MPH

#

Target Crashes

SIGNAL FACE I.D.

⊙

Denotes L.E.D.

⊠

4.5"

⊠

12"

⊠

21

⊠

22

⊠

23, 24

⊠

41, 42

⊠

43, 44

HIBBARD STREET
25 mph

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

SAFETY INFORMATION

MANAGEMENT AND SUPPORT

COLLISION DIAGRAM

DIVISION: 7

AREA: ..

STUDY PERIOD: 3/1/1997 TO 5/31/2002

DISTANCE: Y-LINE: 150 FT

ANALYSIS PREPARED BY: B. Robleson

DIAGRAM PREPARED BY: B. Robleson

DIAGRAM REVIEWED BY:

SCALE: NOT TO SCALE

DATE: Apr 11 2008

LOG NUMBER: 200704285

N.C. DEPARTMENT of TRANSPORTATION

DIVISION of HIGHWAYS

TRAFFIC ENGINEERING AND SAFETY

SYSTEMS BRANCH

Orange County
SR 1902 (Manning Dr) and
Hibbard/Gravely/Hospital Room
After Period
From 9/1/2002-11/30/2007

LEGEND

>

MOVING VEHICLE

>

PEDESTRIAN

▢

PARKED VEHICLE

▢

PARKING VEHICLE

—

FIXED OBJECT

→

HEAD ON

→

REAR END

→

RAN OFF ROAD

↘

ANGLE

↘

TURNING

↘

BACKING

↘

SIDESWIPE

↘

OUT OF CONTROL

↘

INJURY

↘

FATALITY

→

9 MPH OR LESS

→

10 MPH TO 19

→

20 MPH TO 29

→

30 MPH TO 39

→

40 MPH TO 49

→

50 MPH TO 59

→

60 MPH TO 69

→

70 AND UP

→

SPEED UNKNOWN

→

DAYLIGHT CRASH

P

PEDESTRIAN

B

BICYCLE

T

TRAIN

A

ANIMAL

*

DRIVER AT FAULT

D

DRY

W

WET



Note: Crash #4 occurred due to the lead vehicle stopping quickly for pedestrians

SR 1902 (MANNING DRIVE)
25 MPH

HIBBARD STREET
10 MPH

SR 1902 (MANNING DRIVE)
25 MPH

#

Target Crashes

SIGNAL FACE I.D.

12" HOUSING

9"

SYMBOL

Denotes L.E.D.

R

Y

G

21

R

Y

G

22

23, 24

41, 42

43, 44

HIBBARD STREET
25 mph

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

SAFETY INFORMATION MANAGEMENT AND SUPPORT

COLLISION DIAGRAM

DIVISION: 7

AREA: ..

STUDY PERIOD: 9/1/2002 TO 11/30/2007

DISTANCE: Y-LINE: 150 FT

ANALYSIS PREPARED BY: B. Robleson

DIAGRAM PREPARED BY: B. Robleson

DIAGRAM REVIEWED BY:

SCALE: NOT TO SCALE

DATE: Apr 11 2008

LOG NUMBER: 200704285

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TRAFFIC ENGINEERING AND SAFETY

SYSTEMS BRANCH